

Appl. No. 10/580,633  
Amdt. Dated January 30, 2008  
Reply to Office Action of November 30, 2007

Attorney Docket No. 81872.0114  
Customer No. 26021

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently amended): A pressure sensor device comprising:  
a supporting substrate;  
a sensor substrate made of a piezoelectric material, having a lower surface on which a sensor section ~~formed of a surface acoustic wave element~~ for detecting pressure is formed;  
a concave portion formed on the upper surface of the sensor substrate; and  
a sealing member that is joined to an upper surface of the supporting substrate and the lower surface of the sensor substrate and forms a sealing space for sealing the sensor section between the substrates,  
the sensor section being provided with a first surface acoustic wave element for detecting pressure by forming an IDT electrode on the lower surface of the sensor substrate within a region where the concave portion is formed at a plan view, and with a second surface acoustic wave element for reference for comparing output signals of the first surface acoustic wave element and the second surface acoustic wave element on the lower surface of the sensor substrate positioned in a region out of the concave portion at a plan view, wherein a frequency band from a resonance frequency to an antiresonance frequency of the first surface acoustic wave element and a frequency band from a resonance frequency to an antiresonance frequency of the second surface acoustic wave element do not overlap each other, and  
further comprising:  
a first oscillating circuit that oscillates at a predetermined frequency based on the resonance frequency of the first surface acoustic wave element or based on

delay time of an electrical signal generated by the first surface acoustic wave element;

a second oscillating circuit that oscillates at a predetermined frequency based on the resonance frequency of the second surface acoustic wave element based on delay time of an electrical signal generated by the second surface acoustic wave element;

a difference generating circuit that generates and outputs a conversion signal by comparing an oscillation signal from the first oscillating circuit with an oscillation signal from the second oscillating circuit; and

a modulation circuit that modulates the conversion signal from the difference generating circuit and the oscillation signal from the second oscillating circuit and outputs these to the outside.

2. (Canceled)

3. (Previously presented): The pressure sensor device according to Claim 1, wherein an inert gas fills in the sealing space.

4. (Canceled)

5. (Previously presented): The pressure sensor device according to Claim 1, wherein

electrode pads to be electrically connected to the sensor section are provided within the sealing space on the lower surface of the sensor substrate, and

connecting pads to be electrically connected to the electrode pads via conductive bonding members are provided within the sealing space on the upper surface of the supporting substrate.

6. (Previously presented): The pressure sensor device according to Claim 1, wherein the sealing member is made of a conductor material, and is electrically connected to ground terminals provided on the supporting substrate.

7-10. (Canceled)

11. (Currently amended): The pressure sensor device according to Claim [[9]] 1, wherein the ~~both elements~~ first surface acoustic wave element and the second surface acoustic wave element are arranged in line by interposing a reflector therebetween, and the reflector is shared by the surface acoustic wave elements disposed on both sides of the reflector.

12. (Currently amended): The pressure sensor device according to Claim [[9]] 1, wherein a damping member that blocks transmission of surface acoustic waves or lowers the intensities of surface acoustic waves is disposed between the ~~elements~~ first surface acoustic wave element and the second surface acoustic wave element on the sensor substrate.

13. (Currently amended): The pressure sensor device according to Claim [[9]] 1, wherein the ~~elements~~ first surface acoustic wave element and the second surface acoustic wave element are arranged on the sensor substrate so that the surface acoustic wave propagation directions of the elements are parallel to each other and the elements are placed in a direction orthogonal to the surface acoustic wave propagation directions.

14. (Canceled)

15. (Currently amended): The pressure sensor device according to Claim [[9]] 1, wherein an IC chip includes the first oscillating circuit, the second oscillating

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circuit, the difference generating circuit, and the modulation circuit, and the IC chip and the elements first surface acoustic wave element and the second surface acoustic wave element are mounted on the same substrate.

16. (Currently amended): The pressure sensor device according to Claim [[4]] 11, wherein

a thickness of the sensor substrate positioned immediately below the reflector near the IDT electrode is almost equal to that of the region immediately below the IDT electrode, and is gradually increased with distance from the IDT electrode.

17. (Original): The pressure sensor device according to Claim 16, wherein the thickness of the sensor substrate positioned immediately below the IDT electrode is less than the thickness of the sensor substrate positioned immediately below the reflector.

18. (Currently amended): The pressure sensor device according to Claim [[9]] 1, wherein an electronic part element including a part of the oscillating circuits is disposed on the supporting substrate.

19. (Original): The pressure sensor device according to Claim 18, wherein the electronic part element is mounted on the upper surface of the supporting substrate.

20. (Original): The pressure sensor device according to Claim 18, wherein a concave portion is formed on the upper surface or lower surface of the supporting substrate within the sealing space, and an electronic part element including the oscillating circuits is embedded in the concave portion.

21. (Original): The pressure sensor device according to Claim 20, wherein the concave portion is formed on the upper surface of the supporting substrate.

22. (Original): The pressure sensor device according to Claim 18, wherein one end side of one of the sensor substrate and the supporting substrate is extended to form an extended portion while it is spaced from the other substrate, and at the extended portion, an acceleration detecting element for detecting acceleration is provided.

23. (Original): The pressure sensor device according to Claim 22, wherein the extended portion is formed on the sensor substrate.

24. (Previously presented): The pressure sensor device according to Claim 22, comprising:

a transmission circuit that transmits a signal modulated from the conversion signal by the modulation circuit to the outside;

an acceleration detecting circuit that outputs a predetermined electrical signal based on an acceleration detection signal from the acceleration detecting element;

power supply means for supplying power to the transmission circuit; and

a power supply control circuit that controls power supply from the power supply means to the transmission circuit, wherein

the power supply control circuit controls power supply from the power supply means based on whether the acceleration has exceeded a threshold.

25. (Previously presented): The pressure sensor device according to Claim 22, wherein the acceleration detecting element is formed of a surface acoustic wave element.

26. (Previously presented): The pressure sensor device according to Claim 18, wherein an antenna element to be electrically connected to the electronic part element is mounted on the upper surface of the supporting substrate and/or the lower surface of the sensor substrate.

27. (Original): The pressure sensor device according to Claim 26, wherein the antenna element is mounted outside of the sealing space.

28. (Previously presented): The pressure sensor device according to Claim 18, wherein an antenna pattern to be electrically connected to the electronic part element is deposited onto the upper surface of the supporting substrate and/or the lower surface of the sensor substrate.

29. (Original): The pressure sensor device according to Claim 28, wherein the antenna pattern is mounted outside of the sealing space.

30. (Previously presented): The pressure sensor device according to Claim 18, wherein an antenna pattern to be electrically connected to the electronic part element is deposited onto the upper surface of the sensor substrate.

31. (Currently amended): The pressure sensor device according to Claim 30, wherein the antenna pattern is formed in a region except for a region immediately above the first surface acoustic wave element ~~for detecting pressure~~.

32. (Previously presented): The pressure sensor device according to Claim 28, wherein the antenna pattern has a meandered form.